24 The Subtle Life of the Bee and Its Importance for Humanity

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CONTENTS

In this holy hum of bees,
Wing song of pollen hunt and honey,
Can you hear a rhythm
Running through the birth of stars,
And towards our destination, returning towards
An ever awakening ground?
Fragment – Anonymous

THE DEMISE OF THE BEE?

There is an important beehive death going on, for several reasons, first of all environmental pollution, in all its forms. This is a situation of great danger but there is something we can all do with great ease. All you need is a balcony, a flower bed, a piece of land or a vase of flowers that will allow our bees to survive. Bees are hungry because of monocultures and extreme weather conditions.

Find out which essences the bees prefer, from seeds and seedlings that can be found in agricultural stores, in nurseries and in the numerous exhibitions of rare and horticultural plants that adorn the Italian spring with colour, beauty and delicacy, in cities, in villas, parks and castles. Spread the word, share this joyful activity with friends and children! Set a good example and weave new relationships in the name of the good that you do by paying attention to nature and therefore to yourself.

This was the rallying cry at the inception of the 'We sow flowers for the Italian bees' campaign initially broadcast by the ApiSophia Association[1] ('we love and save the bees') of Italy, in the spring–summer of 2018, which continues to be promoted.

Bees have accompanied us in our evolution and are an example of life, of gift and sacrifice, for humanity an example of a totally different social organisation. Wandering around the flowers, sucking the nectar, the bees are covered with an impalpable powder that pollinates most of the plants that humanity feeds on. Honeybees are essential partners for the success of agriculture. Like us, bees also live in a polluted and impoverished environmental context.

[1] apisophia.it.

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Thirty or 40 years ago, every refuelling at the service station necessitated a washing of the car windshield that had become smeared with hundreds of squashed insects. Today, we travel thousands of miles often without even finding one small insect corpse to remove. This personal experience does not need sophisticated scientific investigations and evidence to effectively describe the current condition faced by the insect world (Selg and Wirz, 2015).

All insects, including bees, are exposed to the destruction of their natural environments, impacted by agricultural practices, environmental pollution and diseases. If we pay attention for a moment, we can see Nature in agony, a dying world, and mankind is the cause. In the early months of 2019, some researchers again raised the alarm and highlighted how the rate of extinction of insects was eight times greater than that of mammals: overall insect species have decreased by 41%, the bees by 46%, and the planet is on the threshold of a mass insect extinction, with losses greater than those reported for large animals (Sanchez-Bayo and Wyckhuys, 2019).

Insects are fundamental for the proper functioning of all ecosystems, and bees in particular have suffered from breeding practices that have weakened their nature: the extraordinary increase in the production of honey for commercial purposes, resulting in the exploitation of hives, is in stark contrast to the essential needs of bees and reflects the similar treatment of livestock species in intensive farming. It is important to be aware that, just like other domestic animal species, bees have undergone intensive breeding. The world must change the way food is produced, to recreate an environment with organic and biodynamic farming rich in biodiversity, which is healthy and welcoming to insects and humans (Menestrina, 2019). In his cycle of lectures on The Bees, Rudolf Steiner indicated clearly to the workers of the Goetheanum, Switzerland, the implications of modern beekeeping techniques, including the introduction of new prismatic rather than rounded beehives, of man-made, pre-constructed wax honeycombs instead of the combs built by the bees themselves, of the artificial breeding of queen bees and the feeding of sugar-based products instead of honey. He said, ‘We’ll see it in one hundred years’ (Steiner, 1998: 75).

Today, this prediction can be both seen and heard: the silence around trees and bushes in bloom is symptomatic, it is a deafening silence. Bees are dying, and this topic cyclically resurfaces in newspapers or in popular action, or as a personal protest because of the deep worries of beekeepers (Menestrina, 2016).

The concern for pollination and therefore for the bees’ food supply adds to this picture, but in a broader sense, it must be recognised that bees touch deeper layers in humans than any other living being on Earth. The most worrying aspect of the aforementioned factors is precisely this lack of relationship between human and bee, because the strength and depth of this connection are only partially understood, whereas bees and their social organisation provide a model for future human organisation. As an example, and contrary to popular assumption, bees are not hierarchical. In the hive, everything is done through the bees’ dedication to work and to each one’s specific task. The queen does not reign in the normal sense of the word, but instead is an exceptional mother, laying eggs her whole life long. The bee community, meanwhile, makes common decisions, as in the case of swarming or through taking stock of family developments. Thus, the hive organism is a wonderful example of creatures working together in perfect harmony for their best common interests (Menestrina, 2016).

UNDERSTANDING THE INTRICATE LIFE OF BEES

The majority of people do not know very much about the wonderful world of bees and the wisdom and perfection that is contained in the hive. By getting to know the bee better, they may develop more respect, love and reverence for it.

The inhabitants of the hive are divided into three castes: the queen, the workers and the drones. The worker bees (female) and the drones (male) develop in hexagonal structures that resemble silica crystals, while the queen develops into a round cell that has no relation to the surrounding hexagonal environment. Silica is known to have a very close relationship with light, and for this reason, we can say that worker bees and drones develop inside 'light cells'. The queen needs only 16 days after her egg is laid to develop fully. A worker bee takes about 21 days, and thus, it may be deduced that nature takes much more care in procreating the workers than the queen, while the male drones take longer to mature, between 24 and 25 days.

In his cycle of lectures on The Bees, Rudolf Steiner provides an interesting picture of how the cosmos is involved in this gestation. He explains,

> The Sun turns on its axis once in twenty-one days. Then it will arrive again at this point and begin repeating this movement. The worker uses from the Sun just what she needs to achieve its full development. If the worker were to continue in her development beyond this point, she would leave the Sun development and come into the sphere of influence that the Earth would exert upon her development. (…) The worker enters into Earth development and experiences it only as an already completely developed animal, having achieved its full maturity at twenty-one days. (…) Now consider the drone. It doesn't "feel," as I would put it, that it is completed at twenty-one days and wants to continue into the Earth development phase before it is finished maturing. It is definitely an Earth animal, while the worker is a Sun child, complete within herself. And what about the queen bee? She doesn't even finish the entire Sun cycle of twenty-one days. She lags behind and remains forever a Sun child. (…) With bees, you can really see what it means to be under the influence of the Earth or of the Sun: depending upon whether a bee waits to complete the Sun development phase, it will turn out to be a queen, a worker, or a drone.
>
> *Steiner (1998: 8–9)*

So, based on Steiner's intuition, the queen and worker bees are united by the same solar cycle. This connection has been confirmed by the presence of the queen's pheromones (Fontana, 2017), by research on language and communication within the hive (von Frisch, 1976) and by the ability of bees to process information and develop group strategies (Celli, 2008).

Being the only fertile female in the community, the queen is the mother of all the workers, comprising the future queens and sisters of the drones. Her ability to produce eggs is staggering, often more than 1,500 per day, which is similar in total weight to that of her own body. The queen is very different from the drones and the workers: her body is elongated, and her jaws are armed with sharp teeth, whereas those of her daughters – the workers – are toothless. Also unlike the workers who, when they sting, can no longer remove the serrated barb and die by being gutted, the queen has a curved and smooth sting, which is used to destroy premature pretenders to the throne. She lacks the 'work tools' supplied to the workers, such as the pollen baskets, the wax glands and the honey bag. Unable to feed herself, her diet is exclusively based on the secretions of royal jelly from the hypopharyngeal glands on the heads of the workers. Queen bees may live for up to 5 or even 7 years.

Worker bees are sterile because they are fed with royal jelly only for the first 3 days and then with nectar and honey. If the queen has enough space (in an enlarged and rounded cell) and if she is fed with royal jelly, she develops her sexual organs. Therefore, as with other animals and partly in humans, the environment and food to some extent determine the faculties of the subject and what will be its external work.

Then, there is the drone. The drone is helpless and without a sting. Like the queen, it has no pollen baskets or wax glands and does not secrete royal jelly: its only function is to mate with the queen and contribute modestly to the ventilation of the hive. It is also not able to feed itself, the workers feed him. Worker bees are more numerous than drones, and, in a hive in a temperate climate region, the number of workers varies between 8,000 and 15,000 in springtime and up to 80,000 in early summer. For the first 3 weeks of their life, they carry out tasks within the hive: in the first 3 days – during which they too are fed with royal jelly – they clean the cells. From days 5–14, they feed on pollen while producing royal jelly to feed the queen bee and the newborn worker bees. From days 10–16, they are 'wax bees', and with their epidermal glands positioned on the abdomen between the sternites (hard plates forming the sternum), they produce wax, a fatty substance of entirely animal origin used as a building material. They spend the last few days of their puberty inside the hive sweeping (sweeper bees), keeping watch (guard bees) and ventilating the hive to keep its internal temperature constant at around 35°C–36°C. Finally, from the 21st day, the worker bee takes flight and becomes a bee foraging for water, pollen, nectar and propolis. We can thus observe how the worker bee begins its industrious life with a sort of training period and that, in a crescendo of experience and responsibility, reaches the apotheosis, or highest point, of its life at the 21st day, from when on it exteriorises its work for the hive. The lifespan of the foraging worker bee is variable depending on the season and external conditions and may be up to 6 months in the winter period (Menestrina, 2017).

Now, let's discover the virgin queen who makes a nuptial flight at 3 days of life: on the running board of the hive, we see a 'ping-pong ball' that darts vertically towards the sky: it is the queen surrounded by the drones, coming from up to 15 km away. Once it was supposed that only a maximum of 3 drones would fertilise her, but today, we know that it can be up to 24, and this ensures a very important genetic variability as she takes from all of them the seed that will serve for the rest of her life (Fontana, 2017). The bee family regenerates itself through swarming: the old queen ages and moves away making room for the newborn virgin queen and along with all the bees who are able to fly creates a new family in another hospitable place. It is thus that from a first colony, we now have two, less numerous ones, both of which have to work hard to recreate winter stocks.

Awareness of the needs of bees may bring us to better understand the needs of the environment in relation to human activities (Menestrina, 2019). Further, we may take bees as an example of community, and for the 'ancients', the practice of beekeeping was considered a gateway to the inner journey, so much so that it was recommended to all novices (Thun, 2000).

EVIDENCE ON THE PHYSICAL AND METAPHYSICAL CHARACTERISTICS OF BEES

Research has enabled us to understand more about the complex relationship of the bee with the rest of nature. The bee (along with the ant) produces formic acid as part of its venom. Flying from flower to flower, the bee scatters this formic acid and in doing so makes it available to nature, so that, according to Steiner (in his 1923 lectures The Bees, nos. 7 and 8 (Steiner, 1998)), the soil does not rot or become desertified and so that plants are revitalised. A testimony from biodynamic winemakers explains that in a clean and healthy environment, the bees do their utmost to repair individual grapes damaged by hail, thus avoiding the rotting of the whole bunch (Magrini, 2014).

Recent studies (Khait et al., 2019) have discovered that stressed plants emit airborne sounds that can be recorded remotely, in acoustic chambers and in greenhouses, and that plants possess a faculty akin to hearing, which allows them to hear the buzzing of bees nearby and consequently produce a sweeter nectar to attract the insects to them (Veits et al., 2019). The researchers found that the plants' flowers vibrated mechanically in response to these sounds, suggesting a plausible mechanism whereby the flower serves as the plant's auditory sensory organ. Both the vibration and the nectar response were frequency-specific: the flowers responded to pollinator sounds, but not to other frequency sounds.

Heat plays an important role in their organisation, and in winter, the hive is maintained at a constant temperature, the only example among insects of living in homeotherms, which is otherwise peculiar to mammals (S.I.M.A, 2015). The nectar from different origins is accumulated by the single bee in its stomach, regurgitated and eaten by the next bee. It is sometimes said that the bee is the smallest ruminant on Earth. The honey forms in this way, passing through about 30 individual animals, and finally matures in the cells of the comb in the warmest place of the hive. A universal food is thus born for the whole swarm, which provides them all with the energy they need to maintain a uniform temperature. In homeopathic medicine, Apis is an excellent remedy for acute and subacute inflammations of the skin, mucous membranes and joints, reflecting its relationship with heat (S.I.M.A, 2015).

COLONY COLLAPSE DISORDER AND THE IMPACTS OF ELECTROMAGNETISM

Bee losses have increased over the decades, and scientists suspect that many factors could be responsible for their decline. The Varroa mite, pesticides, viruses, monocultures, poor hygiene in the hive and climatic factors are the most widely cited possibilities (Fabre, 2011). Commencing in 2003–2004, bee colonies worldwide suddenly began to show symptoms of what was termed colony collapse disorder (CCD). CCD initially affects the worker bees, which desert the hive. One of the causal factors is likely to be the constant erosion of the genetic heritage of the species *Apis mellifera*. The extraordinary reshuffling of the subspecies, the selection towards pure breeds – which makes no sense in a non-domesticated animal, and the enormous loss of genetic variability caused by the artificial breeding of queens would logically lead to a 'disease' of the superorganism of the beehive (Contessi, 2016).

Recent efforts have been made to study another potential cause of the bee losses: man-made electromagnetic fields. To understand the potential effects of electromagnetic fields on bees, some context is necessary. Magneto-reception, the perception of the geomagnetic or electromagnetic fields, is a sensory modality well-established across all major groups of vertebrates and some invertebrates, although its presence in humans has rarely been tested and has yielded inconclusive results (Del Bene et al., 2008). Although many migrating and homing animals are sensitive to the Earth's magnetic field, most humans are not consciously aware of the magnetic stimuli that we encounter in everyday life. Either we have lost a shared, ancestral magneto-sensory system, or our system lacks a conscious component with detectable neural activity, meaning that there is no apparent perceptual awareness by us (Wang et al., 2019).

When a biological organism is in an electric and/or magnetic field, an interaction inevitably takes place between the forces of the fields and the electric currents present in the tissues of the organism, which are generally good conductors, in particular at low frequencies. The result is always a 'deviation of the conditions of the tissues from the previous condition of equilibrium', which can be indifferent or manifest as advantageous or harmful, and temporary or permanent (Del Bene et al., 2008).

As already mentioned, flowers vibrate mechanically in response to the buzzing sounds of bees and emit electrical signals, and it has been hypothesised that these weak electric fields, together with other chemical and visual signals, increase the flower's ability to attract pollinating insects. Studying bumblebees has shown that they are able to better distinguish the colours of flowers when they are electrically charged. In addition, insects acquire a positive electric charge during flight, while flowers produce a weak negative charge. When a bumblebee touches a flower, the electric potential of the plant changes and remains thus for a few minutes. This change allows other bumblebees to understand that the flower has been visited recently. Most of the surface of the bee's body has a low potential electric charge. Normally, the antennae carry electric charges opposite to each other, and this polarity can be inverted, apparently at will, within a second. Bees are sensitive to electromagnetic fields: low-frequency fields increase their metabolism, while high-frequency fields cause them to flee. Variations of electromagnetic fields due to anthropogenic interferences can interact negatively with bees, and these interferences can confuse them and prevent them from returning to the hive. Similarly, bees are also sensitive to geomagnetic perturbations caused by solar flares. These flares interfere with their orientation and significantly increase the number of bees that do not return to their hive (Contessi, 2017).

In the 1950s, only 10 pW/cm^2 (Pico-Watts per square centimetre) was found on the ground in the radiofrequency electromagnetic field spectrum from 100 kHz to 300 GHz, whereas current values measure from a million to a billion times higher, owing to the rapid development of telecommunications (Del Bene et al., 2008).

Daniel Fabre published a study in 2011 where he linked the massive disappearance of bees that have been witnessed for almost a decade and especially in Northern Europe and North America, to massive electromagnetic wave pollution that also mainly affected developed countries as a result of the spread of mobile phones. Fabre noted that the electromagnetic waves of a cell phone in activity near a hive disturbed the activity of bees. In particular, the worker bees responded to the frequencies emitted by the cellular phone placed under the hive, producing a typical hum ('piping') normally associated with the intrusion of strangers in the hive or with swarming (the abandonment of the hive to found a new colony), while under the control conditions, this hum (in Fabre's experimental sessions) was completely absent. According to Fabre, the bees' sensitivity to electromagnetic radiation could be explained by the presence of magnetite crystals in the animal's body fat (Sgorbissa, 2011). Back in 1978, Gould et al. have shown how the abdomen of adult bees contained very fine granules of a kind of 'magnetic memory' that could produce sensitivity to magnetic fields. Subsequent investigations showed that this magnetite iron was derived mostly from pollen, with higher levels found in the trophocytes or fat storage cells of foragers, up to levels of about 2.2 μg Fe/mg (Kuterbach, 1985). Scholars have since found that honey bees undergo iron biomineralisation, providing the basis for such a magneto-receptor located in the abdomen. This magneto-reception of honeybees has also been proposed on the basis of much behavioural evidence: the behavioural changes in comb building, the strength of the hive, the weight and quantity of bees, and the homing orientation when an extra magnetic field is added (Lambinet et al., 2017).

Therefore, there is clear evidence that electromagnetic frequencies are damaging to the health and behaviour of the bee, and, along with chemical pollution, there is little that the individual beekeeper can do except refrain from siting his/her beehives near a mobile phone mast or industrial farmscapes.

BEE-FRIENDLY BEEKEEPING

We know that environment and nutrition are key determinants of animal welfare and that animal health is ensured by a correct relationship between metabolism and internal homeostasis through the polarity of the transformation and maintenance – given by the constant relationship over time – of the *pH of gastric juice to the pH of blood* at optimal values. Crucially, bees must eat nectar, pollen and honey, and not sugar and syrup.

Regarding hive conditions, ApiSophia, inspired by Kozak and Curries' study on the effects of temperature and ventilation on Varroa (2011), has been conducting field surveys aimed at identifying more suitable housing solutions that would facilitate – rather than counteract – the bees' metabolic processes, and checking whether, in certain beehives, optimal environmental conditions could be found that are unconducive to Varroa infestation. Monitoring has confirmed substantial and very interesting differences in temperature as well as carbon dioxide concentration, between hives with a closed wooden bottom (which were used before the 1980s and prior to the advent of the Varroa mite) and those with a net bottom and tray below. In addition, hives with a closed bottom show to allow bees to ensure the cleanliness of the hive. *Sun hives*[2] have also been examined and are showing excellent performance, their ovoid structure allowing for the movement of gases. Particularly detrimental however is the use of sheet metal rooves, because these can produce too much heat. This research is ongoing and will, when finalised, be available on the ApiSophia website.

It is essential for the life of the colony that the combs are made of 'pure' beeswax. In nature, bees are perfectly capable of building honeycombs without the beekeeper's intervention, but to facilitate their work (and reduce honey consumption by the bees), waxy sheets are used. Extreme care must be taken with the wax used for the preparation of the waxy sheets, as the wax, being a fatty substance, absorbs and retains fat-soluble pollutants including most pesticides. Moreover, owing to its

[2] The Sun Hive is an alternative beehive made of straw and designed by Günther Mancke (German beekeeper and sculptor; 1925–2020) to mimic the form of wild beehives.

high cost and scarcity, wax lends itself to tampering, and some producers add paraffin. Both the choice of location and the level of permanence of the apiaries can reduce problems of environmental contamination of the wax, which is itself a fatty substance that absorbs and holds toxic substances. The use of old combs is recommended, because they are rich in propolis that makes the wax more rigid, which can then better transmit the vibrations that bees produce, in particular the dance of the explorer bees as they communicate the location of the flower fields (Contessi, 2017).

Conventional beekeepers oppose swarming in order to maintain families rich in foraging bees, gaining an abundance of honey by artificially preventing the family from separating. Other beekeepers, more sensitive to the species' requirements, allow swarming and thus enable the only form of natural evolution possible for the hive organism. It can be said that conventional beekeepers violently enter the hive to profit from their forced overproduction and unfortunately ignore good management maxims such as 'Bees must eat honey and not sugar', or 'Let them swarm, it is their only form of regeneration'. Moreover, some beekeepers change the queen every year in the belief that she lays more eggs, but in fact, queens live 5 or more years and, like cows, they improve their performance with age.

Enlightened beekeepers should be universally recognised for the dedication they offer for all of humanity. Honey, wax, pollen and propolis can be seen as a gift from bees for humanity, and even their poison – painful for us if stung, becomes a medicine, a therapy. Beekeeping and agriculture are sisters, as they were when every farmer had his/her own hive, with honey being a by-product of little interest compared to the bees' role among the flowers, the trees and around the farmhouse, for the sake of the environment and the family.

CONCLUSION: THE IMPORTANCE OF FLOWER POWER

In many respects, we should consider the beehive as not just the hive itself but as the whole 3-km foraging radius or territory of the worker bees. This is the organism of which bees are the cells that nourish and feed on the flowers. In this way, everyone can help to create a bee-friendly world, a natural setting with wonderful flowered pastures seeded specifically for bees. We are thus all encouraged to guard the spontaneous borders of the fields, to plant and care for flowering meadows, to sow strips of wild flowers in urban and residential areas, in our gardens and on our balconies. Bees need pollen and nectar plants, and we can plan sowing and planting for next spring–summer, because it is precisely in summer that bees are more hungry. We can sow perennial mint (*Labiata*), scalar seedlings of purple tansy (*Phacelia*), borage and black mustard, flower beds destined for the annual sowing of garlic, poppies, sunflowers, celery, sweet clover (*Melilotus*). Bees will also enjoy the Japanese medlar, the viburnum, the snowdrops, the first hazelnuts, the veronica, the first dandelion, the willow, the minor ash, the cornelian cherry tree (*Cornus mas*). We find them on the catkins of the alder and the winter honeysuckle (*Lonicera fragrantissima*) and then again on the now more frequent dandelion and so gradually in a continuous and more intense dance. In this way, the desire to give bees a great wealth of flowers, including ornamental and aromatic, will be born, to realise for them what we call *the bee pharmacy*, because biodynamic beekeepers believe that if bees have the possibility, they will choose the plants and flowers that for them are curatives, similar to grazing cows, which choose the right herbs that, during their milk cycle, help their calves to recover from juvenile diseases (Menestrina, 2019).

In his cycle of lectures on The Bees, Rudolf Steiner said: 'Actually, every human being should show the greatest interest in this subject, because, much more than you can imagine, our lives depend upon beekeeping' (1998: 5). So, what we now consider to be the need of bees is increasingly being seen as our need, because a world in which bees can no longer live is a world that lacks what is essential for man. In this sense, bee health is a responsibility of all human beings (Menestrina, 2016) (Figure 24.1).

FIGURE 24.1 'VITA NOVA' (New Life) by Julia Artico, Villa Maser, Treviso, Italy.

Bees Humankind Hexagon Crystal Light: This pentad, born from the encounter with a lecture by Rudolf Steiner on bees, generated the form of VITA NOVA. In a spiritual dialogue with the iconographic pathway enshrined in Villa Maser, the Vitruvian Man unexpectedly finds himself inscribed in a hexagon, evoking a bright future in harmony with every kingdom of nature. The life of bees and healthy beekeeping form an authentic image of this future (with permission from Julia Artico, JULIAARTICO.IT).

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